REMARKS

The foregoing amendment does not involve new matter. The amendment of claim 28 incorporates features from original claim 1 and information on page 18, line 24 to page 19, line 7. Claim 37 is supported by the drawings. Clam 38 is patterned after original claim 2.

Examiner King is thanked for the courtesy of a telephone interview with the below signed attorney on February 25, 2008. During that interview, claim 28 was discussed. U.S. Patent No. 4,696,320 (Bull) and A.H. Church, "ALTERING WOUND SPRINGS To Modify Their Deflection Rates" (Church) were discussed. No amendments were presented. The thrust of the primary argument presented is included in the remarks below. No agreement was reached.

In the January 8, 2008 Office Action, claims 28, 31 and 33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bull in view of Church. This rejection is respectfully traversed.

Claim 28 calls for a method of preparing and using a coil spring in a pressure relief valve and requires a) measuring the spring rate of the coil spring; b) modifying the spring after measuring its spring rate so as to modify its spring rate to be within ±2% of a target spring rate, and c) building a pressure relief valve having an inlet, a disk member closable on the inlet and a mechanism biasing the disk member on the inlet, a body, and an outlet, wherein the disk member and inlet are configured to provide a huddling chamber, with the modified coil spring being used in the biasing mechanism.

The Office Action takes the position that Bull discloses a relief valve device, and that it would be desirable to have a valve with a different spring rate for varying applications. The Office Action also takes the position that Church teaches a method of measuring a spring rate and then machining the outer diameter of the spring until the spring is within a specific tolerance. It is then asserted that it would have been obvious to have provided Bull with a spring having its spring rate modified by the teachings of Church to provide a spring which will operate to the designed pressure, within proper pressure tolerances and further to ensure reliability.

As explained during the telephone interview, the present invention came about during the development of a pressure relief valve that has a snap-type opening

characteristic with a low blow-down value, and further where the blow-down value is not contingent on the downstream piping. The design of such a valve is outlined in the specification. During the development of the new valves, and a method of manufacturing such valves, it was discovered that the spring rate used in such valves had to be unusually consistent (±2%) from one spring to the next in order to be able to make a series of valves that could cover the expected operating ranges for the series, as explained on pages 4-7 and 21 of the specification. This is opposed to the situation in typical prior art safety relief valves, where the adjustment screw setting can simply be modified to deal with a spring rate difference from one spring to the next of a typical range of ±7% when setting the set pressure for the valve.

Bull discloses a pressure regulating valve that includes an internal diaphragm. Bull has a valve stem rotatably mounted in the valve bonnet that adjusts a valve nut for varying the compression of the spring, and thereby the spring force on the diaphragm, do adjust the pressure of the gas delivered by the regulating valve. Bull is thus like a typical pressure relief valve in the fact that the set pressure is adjustable by adjusting the preloaded force that is applied by a spring. To obtain greater force, the adjustment screw is turned, compressing the spring, and thereby generating more force. There is nothing in Bull that suggests that it is desirable to have a valve with a different spring rate for different applications as alleged in the Office Action. Instead, Bull teaches, in Col. 4, lines 52-66, how to adjust the spring force to achieve a desired spring force. There is no suggestion that the spring needs to have any specific spring rate, or that springs with different spring rates would be desirable for different applications.

There is no reason, absent hindsight of the present invention, to combine the teachings of Bull and Church. Church notes that wound coil springs have a usual tolerance of ±5%. Church then goes on to discuss ways of modifying the rate of such springs. However, the only uses for springs that need such modified rates discussed in Church are weighing devices and governors. There is no suggestion that springs used in pressure relief valves need to have a tight range of spring rates. And in fact, the vary nature of Bull in particular, and prior art pressure relief valves in general, dictates that the springs with a commercial tolerance in the spring rate are acceptable. When a device such as the pressure regulating valve of Bull is built, it is a simple matter to deal

with a variation in the rate of the given spring used to build the specific device by simply turning adjusting knob 15 to obtain the desired compression and hence the desired spring force.

There is no teaching or suggestion in Bull to either measure the spring rate of any spring, or to modify the spring rate. The Examiner posited, during the telephone interview, that at the extreme ends of its set pressure range, there would be a need for a tighter spring rate in Bull, which would then be served by modifying spring rates as taught by Church. However, this suggestion is not born out by prior art practice. Prior to the present invention, manufacturers of pressure relief valves take into account the spring rate variation when engineering the valve and the range of set pressures it will be suitable for. As outlined on page 4 of the specification, valve manufactures typically specify a reduced operating range for their valves to account for the spring rate tolerance. Until the present invention, a person of ordinary skill in the art would not have thought of taking a given spring and modifying its spring rate and then using the modified spring to build a pressure relief valve.

Further, claim 28 has been amended to specify valve structure, including a huddling chamber. The use of a huddling chamber is not taught in Bull. Further, the use of a huddling chamber contributes to the snap opening and low blow-down value of preferred valves of the present invention. Since Bull is a pressure regulating valve, there would be no reason to modify Bull to have a huddling chamber.

Since it would not have been obvious absent hindsight of the present invention to combine the teachings of Bull and Church, and since Bull does not include a huddling chamber, claim 28 is patentable over Bull and Church. Claims 31 and 33 are dependent on claim 28 and are patentable over Bull and Church for at least the same reasons as claim 28. Thus, all the claims under consideration in the application are allowable over the cited prior art. Further, since claim 28 is a generic claim, the allowability of claim 28 requires the species restriction to be withdrawn. Claims 29, 30, 32 and 34, dependent on claim 28, should be brought back into consideration and allowed.

It is believed that the case is in condition for allowance. An early notice to that effect is respectfully requested.

Applicants respectfully request the Examiner to review the claims and the prosecution history, including Office Actions issued by the U.S. Patent and Trademark Office, for U.S. Patent No. 7,337,796 and pending U.S. Patent Application Serial No. 11/840,053, since the specifications include common subject matter. The '796 patent issued from a divisional application of the present application. The '053 application is a divisional of the present application.

Respectfully submitted,

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